


**FACTS
ABOUT**

INSULATION



SILVERCOTE

Reflective Insulation

SILVERCOTE PRODUCTS, INC.

KALAMAZOO, MICHIGAN

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**ASSOCIATION
FOR
PRESERVATION
TECHNOLOGY,
INTERNATIONAL**
www.apti.org

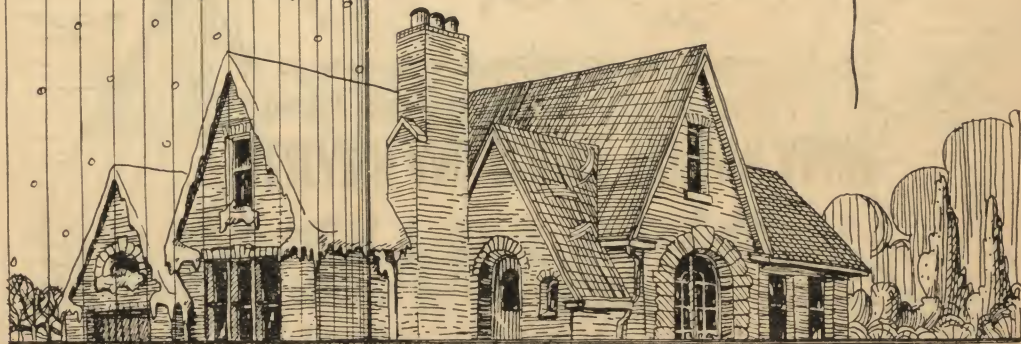
**BUILDING
TECHNOLOGY
HERITAGE
LIBRARY**

<https://archive.org/details/buildingtechnologyheritagelibrary>

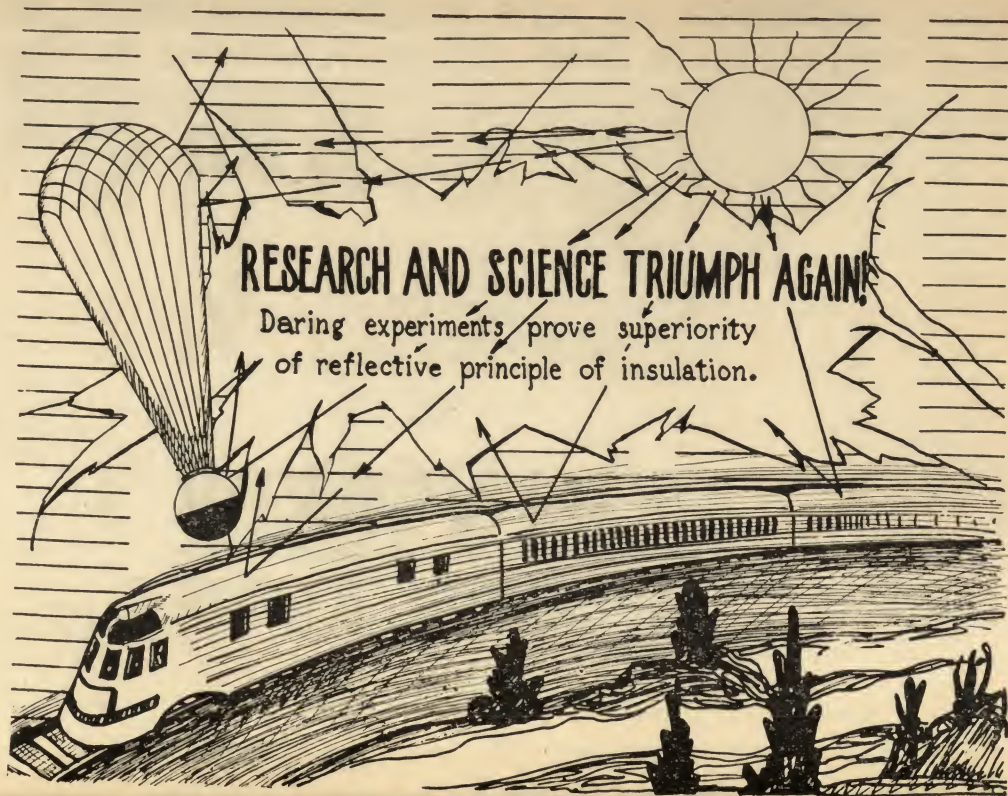
From the collection of:

Mike Jackson, FAIA

Facts about INSULATION



Figures, statements, and data shown herein are taken from the "Heating & Ventilating Guide" & the "Refrigerating Data Book".



RESEARCH AND SCIENCE TRIUMPH AGAIN!

Daring experiments prove superiority
of reflective principle of insulation.

Heat travels in three ways:

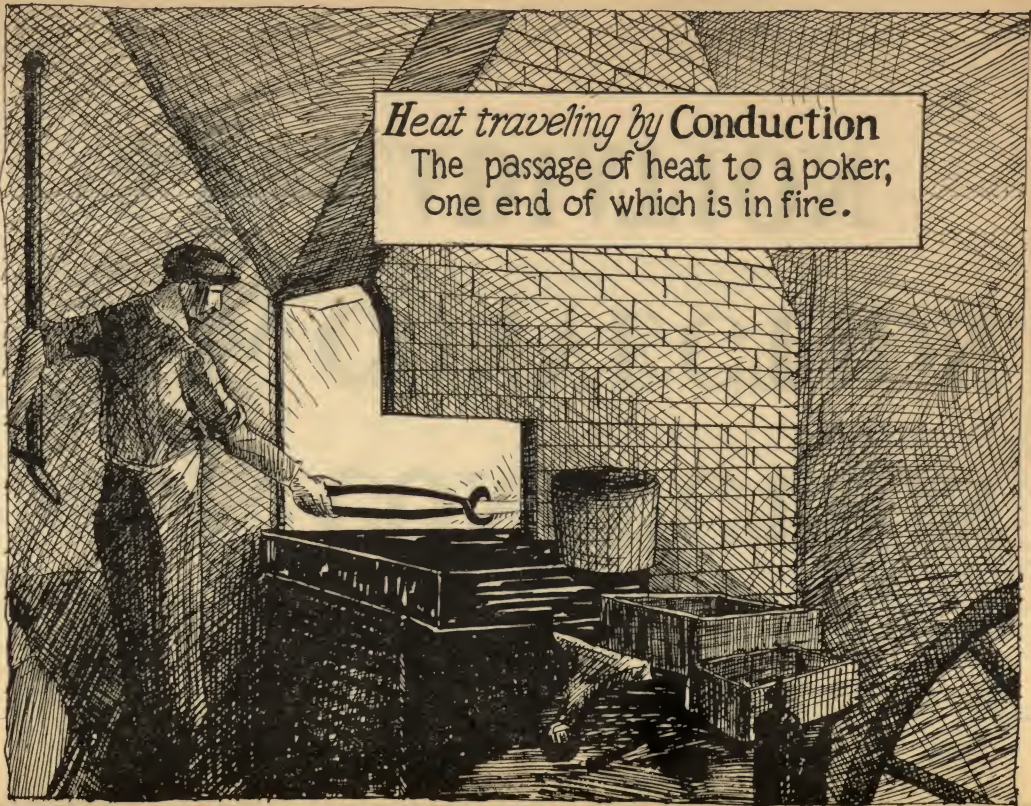
1. by CONDUCTION

2. by CONVECTION

3. by RADIATION

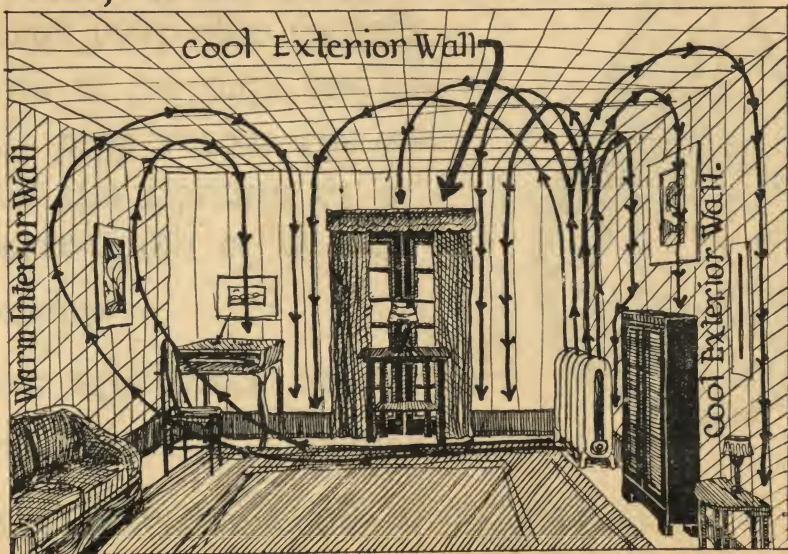
Heat traveling by Conduction

The passage of heat to a poker, one end of which is in fire.



Heat traveling by Convection

The rising of heated air, its passage to the ceiling, usually upwards along interior heated walls, downward along cooler "exterior" walls and windows, - or the movement of heated air.



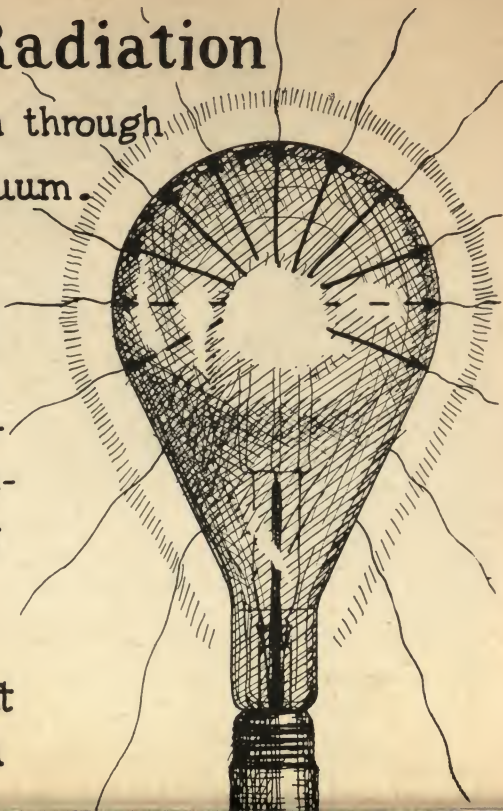
Heat traveling by Radiation

Heat travels by radiation through space, atmosphere, or vacuum.

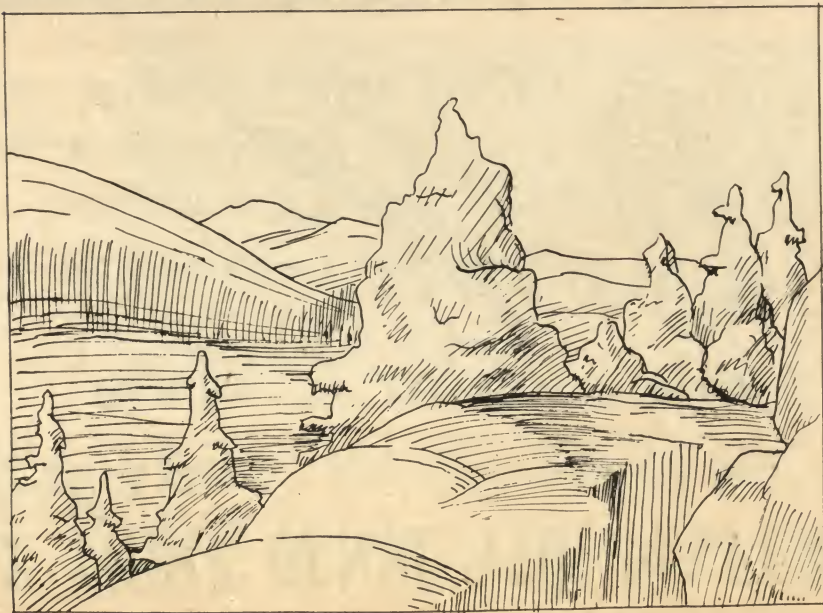
Example ~

The passage of energy from the filament of a light bulb across the vacuum in the bulb and becoming heat upon contact with the glass.

60% to 80% of all heat loss through a wall is in the form of radiant heat.



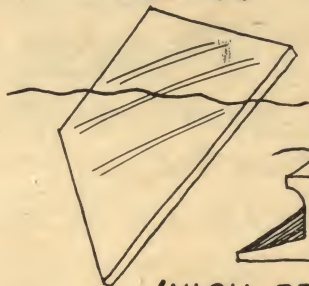
Heat is a form of energy. Cold is simply an expression indicating lower temperatures. It is not a form of energy. Cold is simply an absence of heat in some degree.



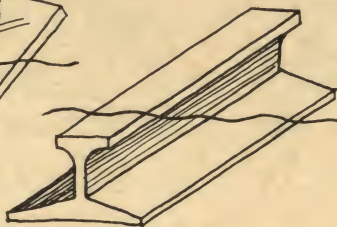
THE MORE DENSE THE MATERIAL

such as ~

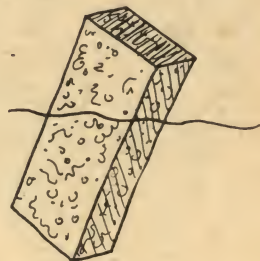
GLASS



IRON



BRICK



(HIGH DENSITY MATERIAL)

the closer the molecules, and the more rapidly heat is conducted through the material.

Optimum Density.

MATERIAL
TOO HARD →

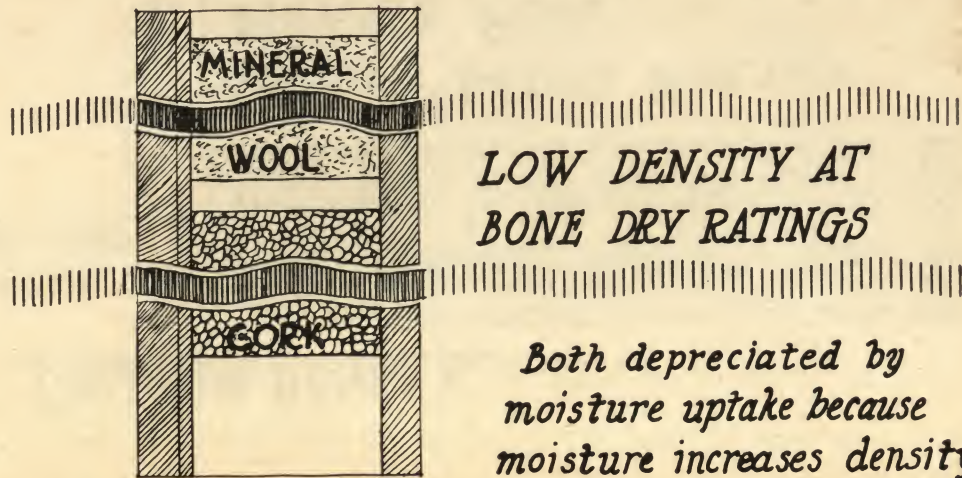
**Over Optimum Density Means
Increase in Heat Conduction.**

**Optimum Density Means
Maximum Value.**

MATERIAL
TOO FLUFFY →

**Below Optimum Density Means
Heat Transferred by Air Filtration.**

Conductive types of insulation merely slow up flow of heat from hot to cold depending on density and on their freedom from moisture.



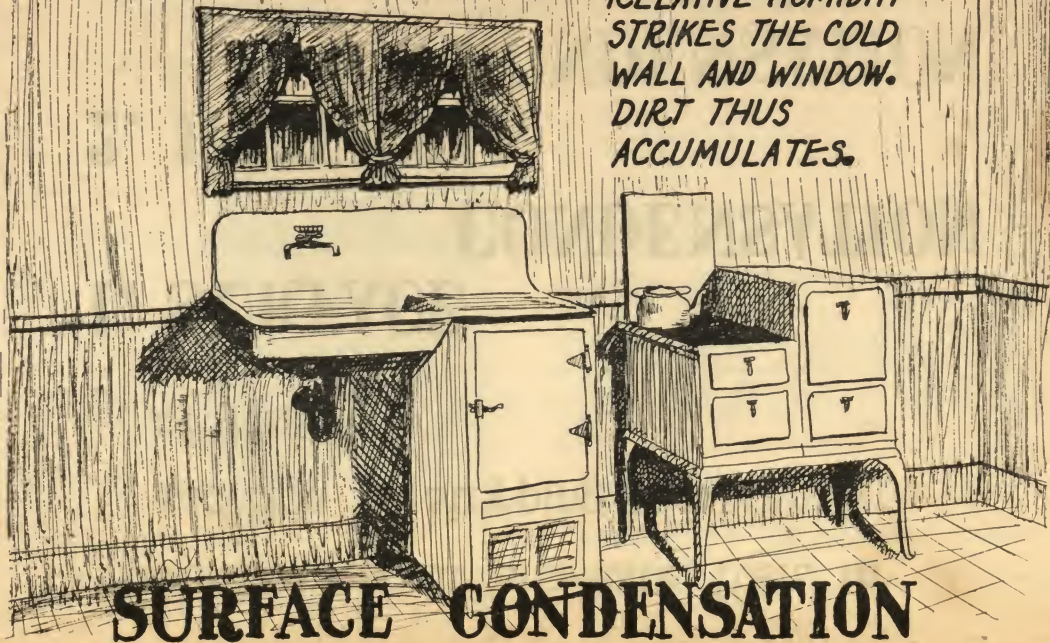
Insulation should eliminate, then, in addition to stopping the transfer of heat ~

**1. SURFACE
CONDENSATION**

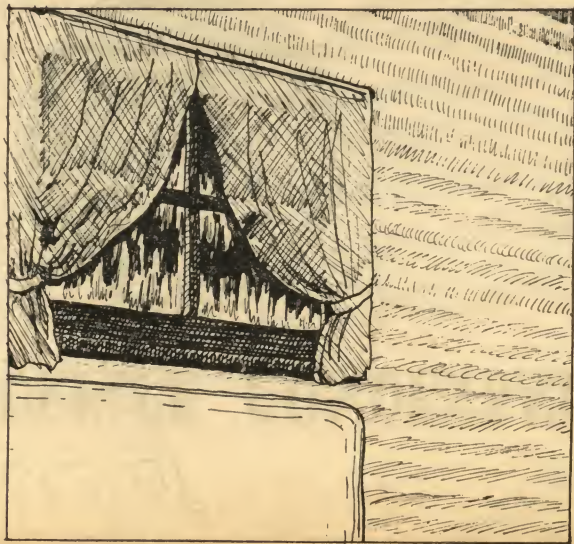
**2. INTERNAL
CONDENSATION**

**3. WIND
INFILTRATION**

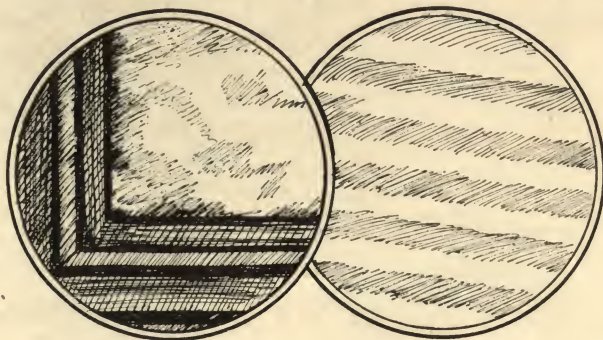
**SURFACE CONDENSATION OCCURS
WHEN THE ATMOSPHERE
IN THIS ROOM OF
75°F. CARRYING 50%
RELATIVE HUMIDITY
STRIKES THE COLD
WALL AND WINDOW.
DIRT THUS
ACCUMULATES.**



A closeup of this cold kitchen wall
and window looks like this ~ frost on
windows and dirty lath marks on walls.



Effects of **SURFACE CONDENSATION**

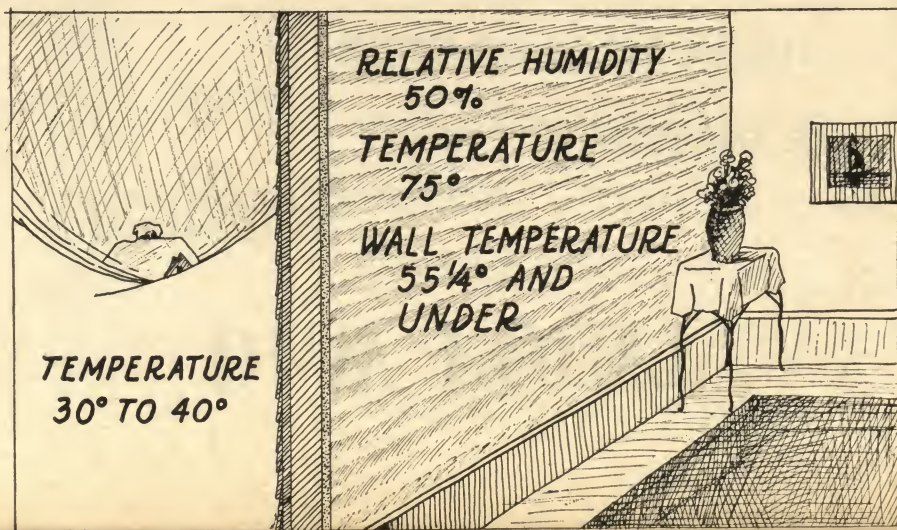


DIRT DEPOSITS LATH MARKS

**The dirty walls in the room indicate
source of heat loss.**

Why lath marks?

The plaster space between each of the laths is lower in temperature; hence, a greater amount of dirt and moisture is deposited, and greater heat losses occur at these spaces.

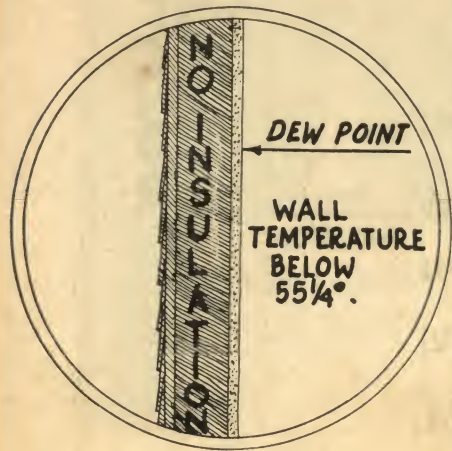


"DEW POINT"

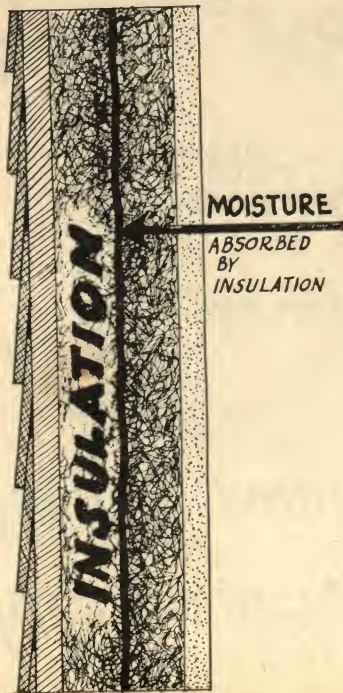
DEFINITION:

A temperature at
which moisture in air
will no longer remain in
suspension.

To eliminate lath marks and surface condensation we must move the dew point from the wall surface



The way to do that would be to put insulation in the wall so as to bring the wall surface temperature above the dew point or more nearly in line with atmospheric temperature in the room.



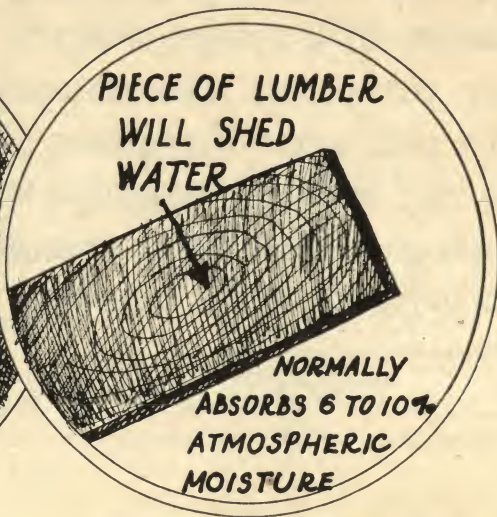
The cold outside air and the inside warm moist air **MUST** meet somewhere in the wall.

When they meet the warm moist air is cooled, thus creating a dew point causing moisture accumulation in the insulation itself. This increases the density of the insulation material.

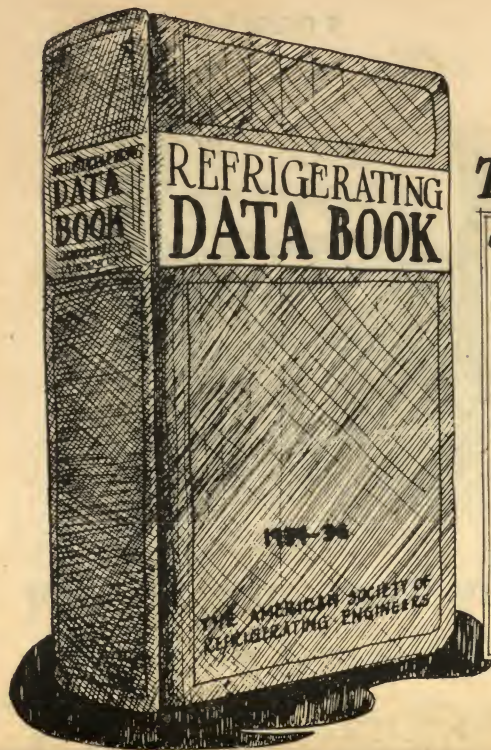
As applied to resisting penetration of atmospheric moisture, a plastered wall may be compared with a lace curtain. Both are porous to that element.



POROUS



**WATERPROOF, BUT NOT
MOISTURE PROOF**

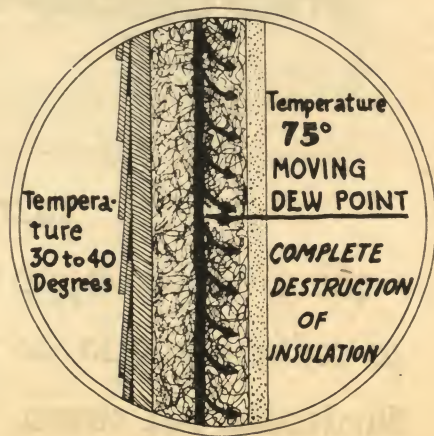


This book states~

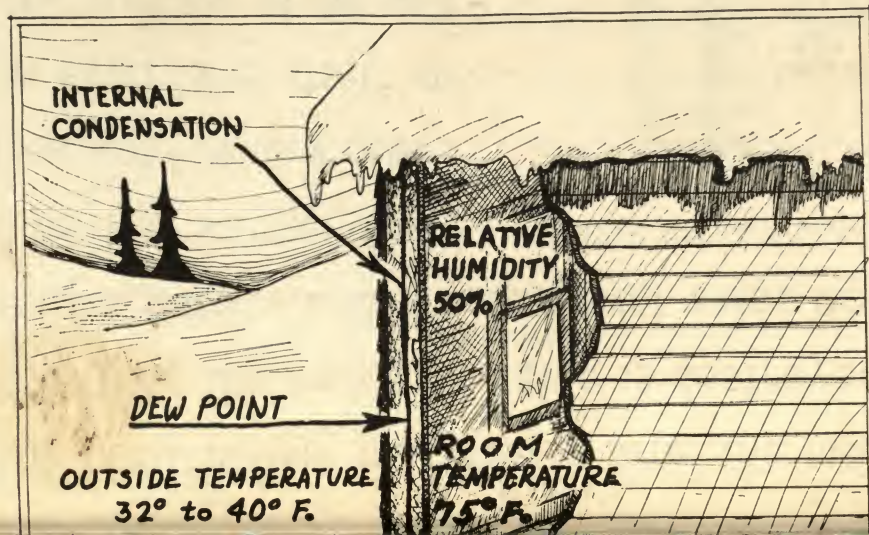
"McPherson has made extended studies of the behavior of moisture in refrigerators, finding that even in hermetically sealed steel walls moisture moves around, and that it always collects in the bottom to the extent of complete drenching."

Page 239

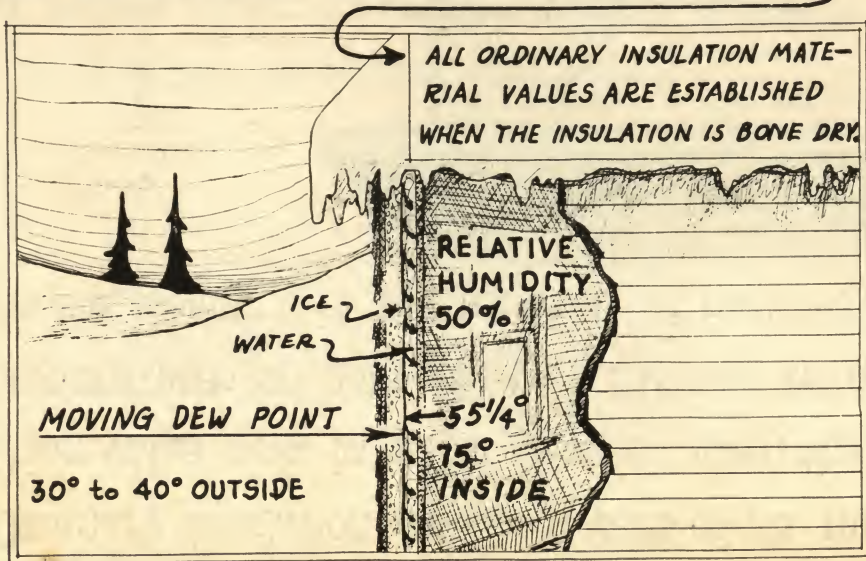
At the point in the material where the moisture is deposited, the insulation value is destroyed by increased density and the dew point keeps moving towards the warmer wall surface until the dew point again establishes itself upon the surface of the wall. This proves definite depreciation of the value of the insulation.



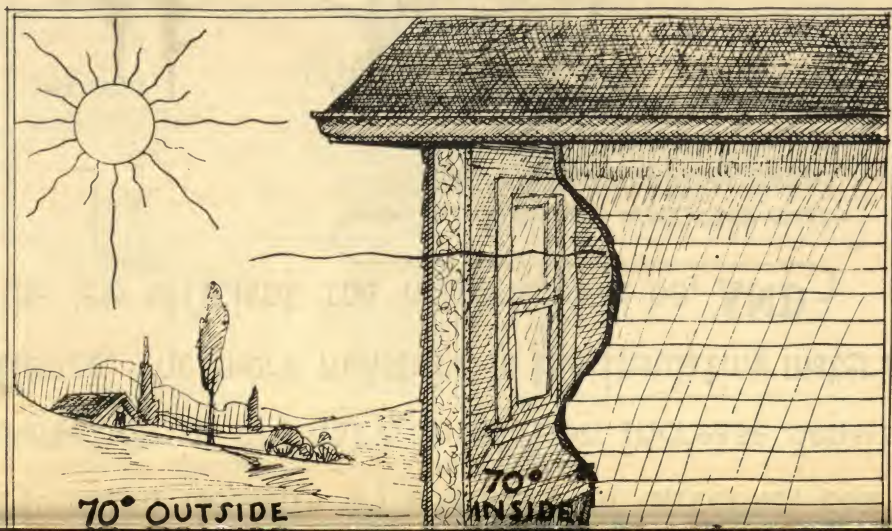
"Internal Condensation" means the depositing of moisture in conventional or ordinary types of insulation due to extreme differences in outside and inside temperatures.



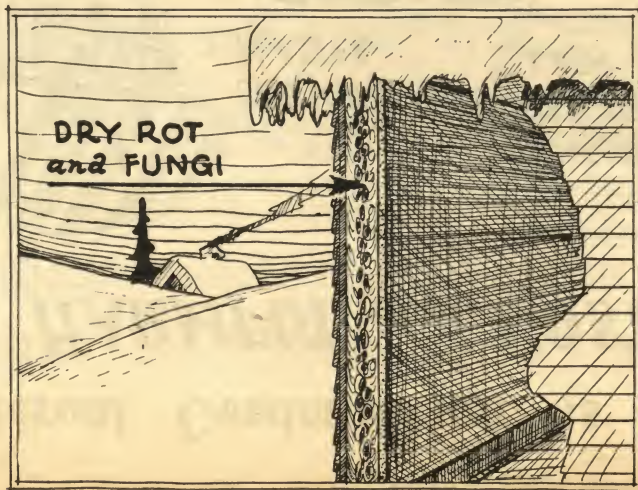
Moisture deposits as a result of internal condensation in ordinary insulation increase density. Hence, the more moisture in the insulating material the less efficient the material will be, **AND**



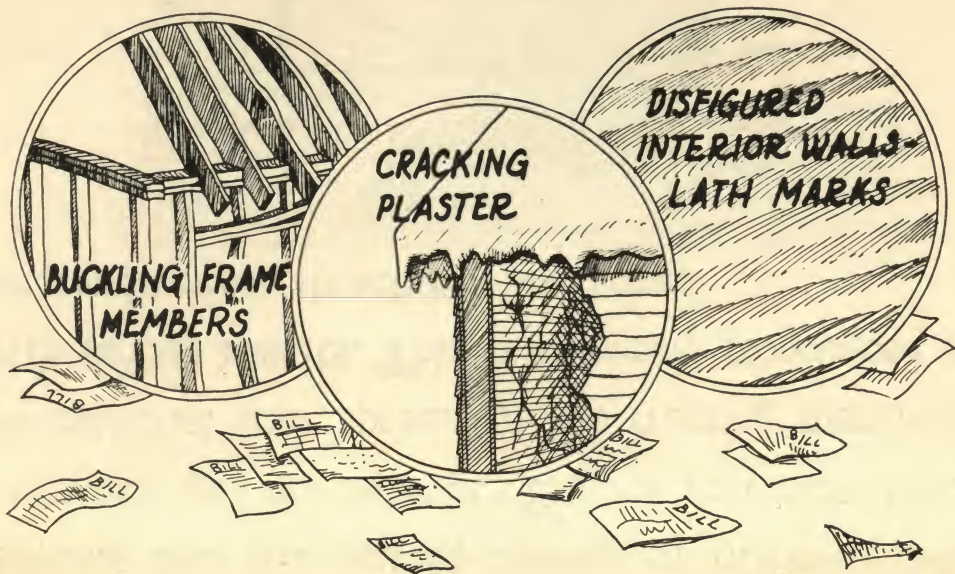
Ordinary insulation regains a part of its insulation value only in warm weather when the temperatures on both sides of the wall are equal and the moisture in the material is reduced.



Wetting and subsequent drying of ordinary insulation damages the material. Dry rot and fungi attack the material and spread to the framing members with serious results. This is extremely pronounced in air conditioned structures and homes.



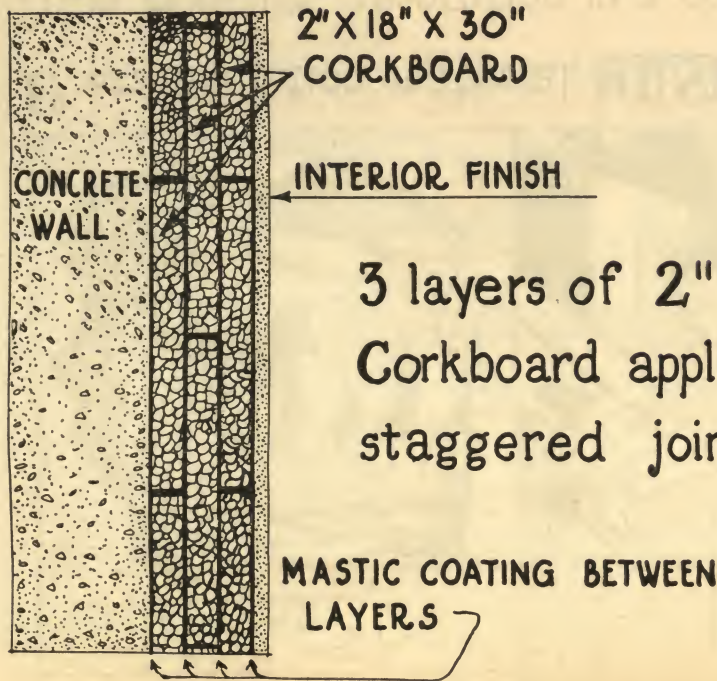
Internal Condensation is
HARMFUL and COSTLY!



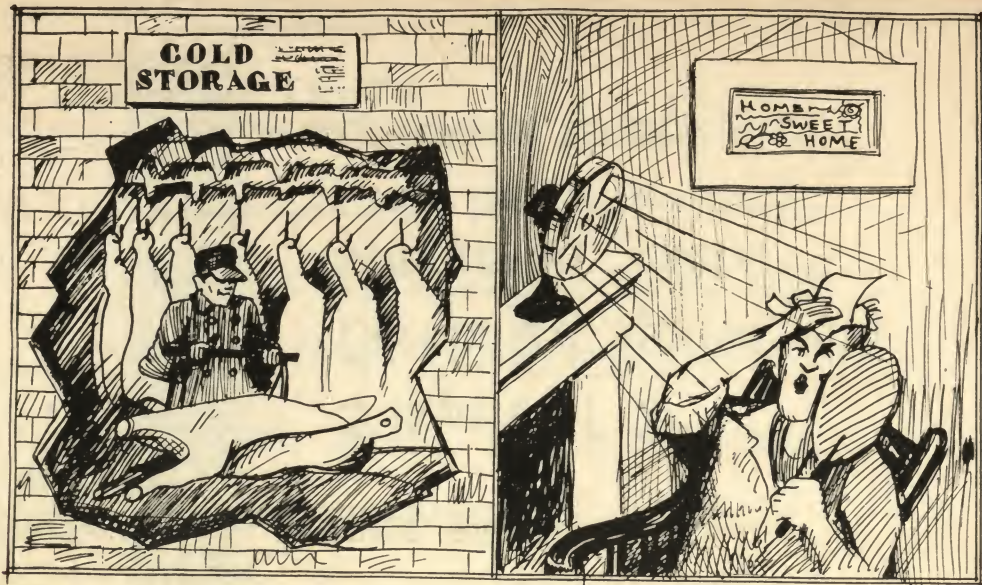
From the standpoint of temperature variation there is little difference between an ordinary house wall and a wall in a cold storage plant. Cold storage insulation is always protected against moisture absorption as it is installed.

Before applying cork insulation in cold storage plants, the walls are first hermetically sealed with asphalt blown on with pneumatic pressure guns. Each cork block is submerged in a hot asphalt bath to hermetically seal it against moisture absorption.

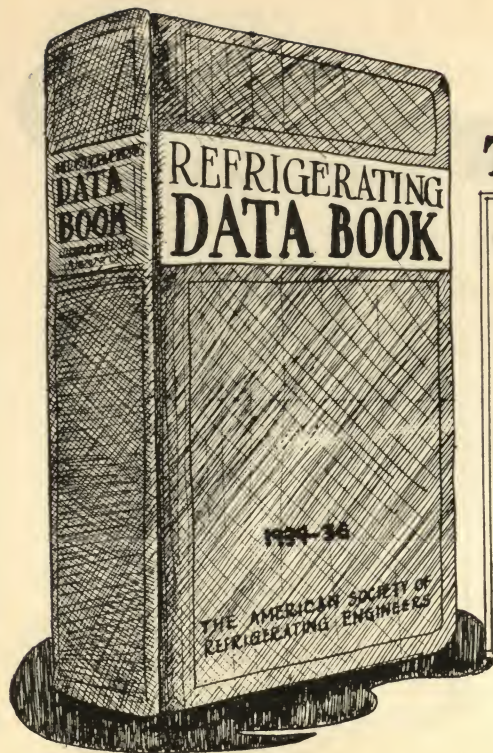
One method of constructing a cold storage wall:



3 layers of 2"
Corkboard applied with
staggered joints.



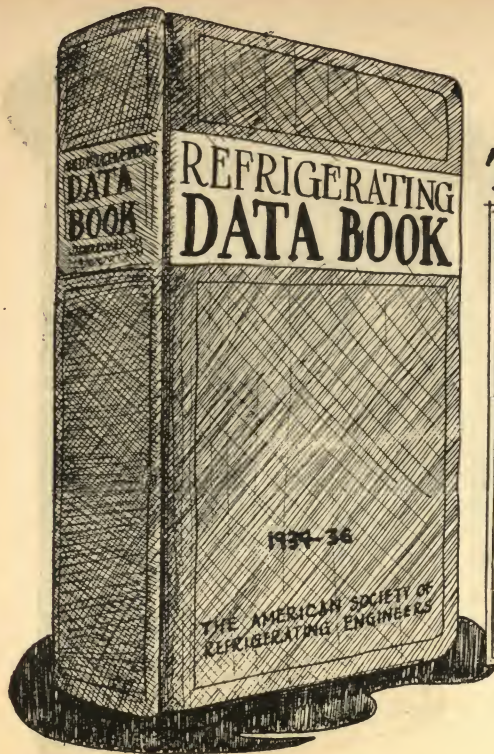
If an insulation material **MUST** be protected from moisture absorption in a cold storage plant, then it **SHOULD** be protected when used in a house.



This book states:

“An entirely satisfactory commercial method for applying insulation has not been found.”

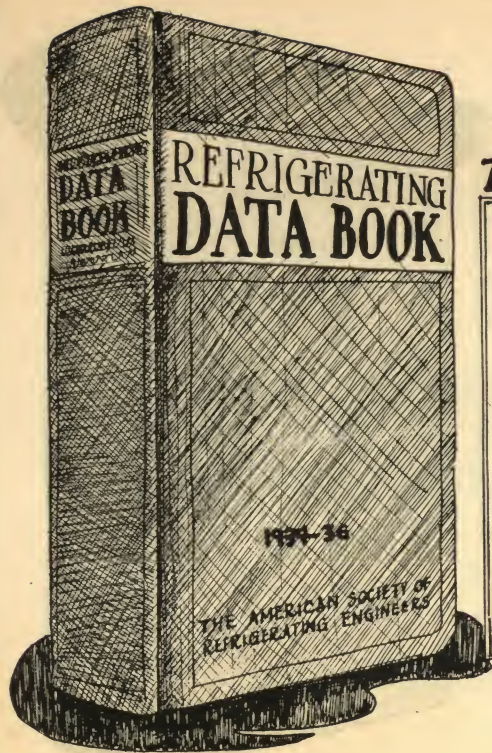
~ Page 237



This book states:

“Practical measures of moisture protection constitute the chief element of the problem of application of insulation.**”**

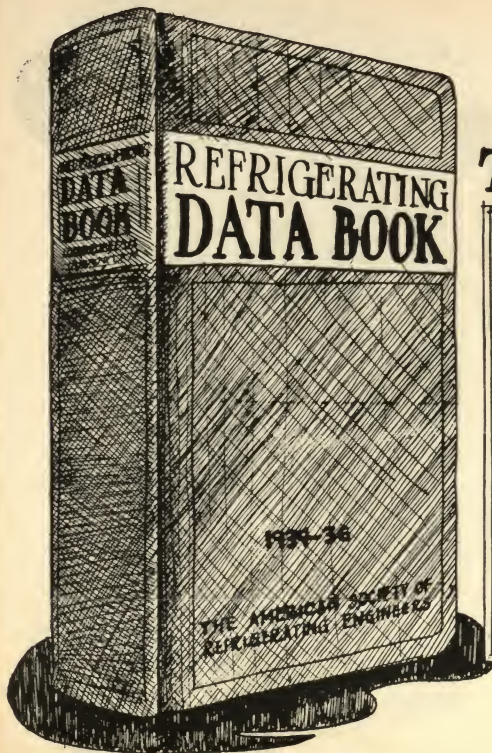
Page 237



This book states:

"No waterproof materials used in applying insulation are vapor proof."

-Page 237



This book states:

"Due to infiltration of moisture, insulating material deteriorates in time, causing loss of insulating value and disintegration."

~ Page 237

Winter air conditioning means stepping up the moisture content of heated air. This situation makes obsolete all porous, moisture absorbing forms of insulation.

At bone dry ordinary insulations provide a good insulation efficiency because they are porous.

But, in addition to moisture uptake, they are further depreciated by **WIND INFILTRATION** at cracks between siding and sheathing allowing wind to pass into the porous insulation itself.

"The natural movement of air through building construction is due to two causes. One is the pressure exerted by the wind; the other is the difference in density of outside and inside air because of differences in temperature."

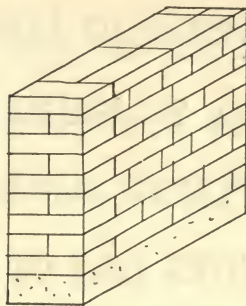
from the "Heating & Ventilating Guide"
Page 119

AIR INFILTRATION THROUGH WALLS

Expressed in cubic feet of wind infiltration
per square foot of wall area per hour

8½" Brick Construction

Wind
Velocity
25 Miles per
Hour.

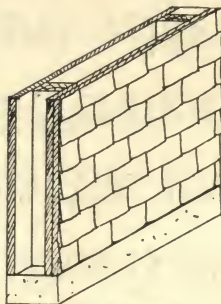


INFILTRATION

18.6 cu. ft. per sq. ft.
of wall area per hour.

Frame Construction

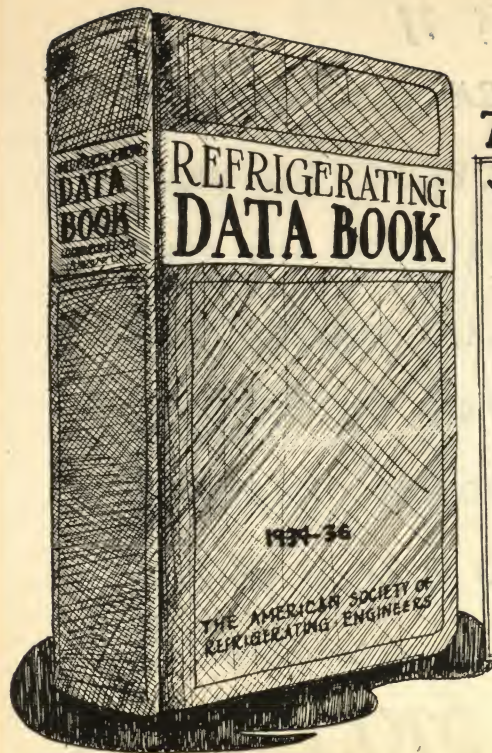
Wind
Velocity
25 Miles per
Hour.



INFILTRATION

35.0 cu. ft. per sq. ft.
of wall area per hour.

From the "Heating & Ventilating Guide" ~ Page 120.



This book states:

"It cannot be said too often, however, that conductivity of laboratory samples on the thickness basis has had more attention than it deserves. It is only part of the story, even in theory, and in practice the other items discussed here may quite overshadow it."

Page 231

Silvercote Fabric

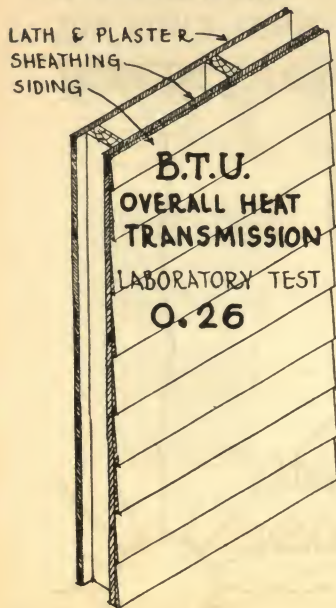
is impervious to wind infiltration because it is a dense, homogeneous material. It does not consider "Density" as its insulation efficiency does not depend on slow conduction, but on reflection of heat from its surface.

It is wind proof ~

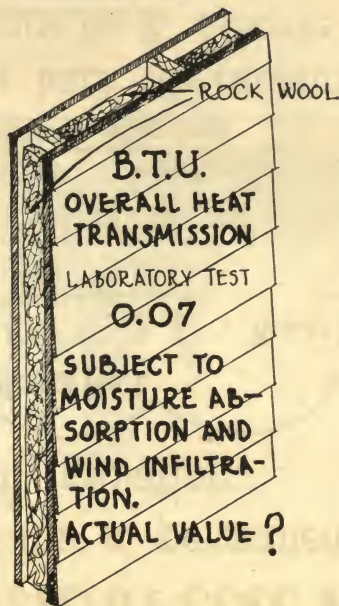
It is moisture proof.

WALL INSULATION EFFICIENCIES

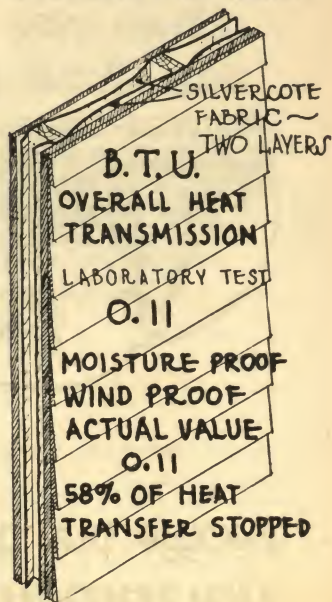
NO INSULATION

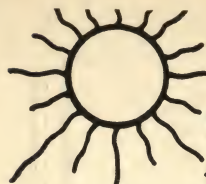


ROCK WOOL



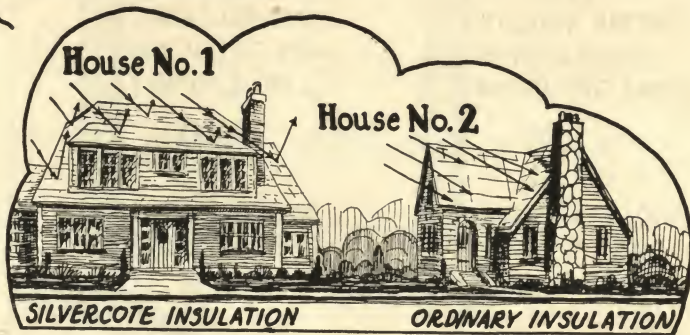
SILVERCOTE FABRIC





Silvercote Insulation

represents a permanent and efficient type of insulation.



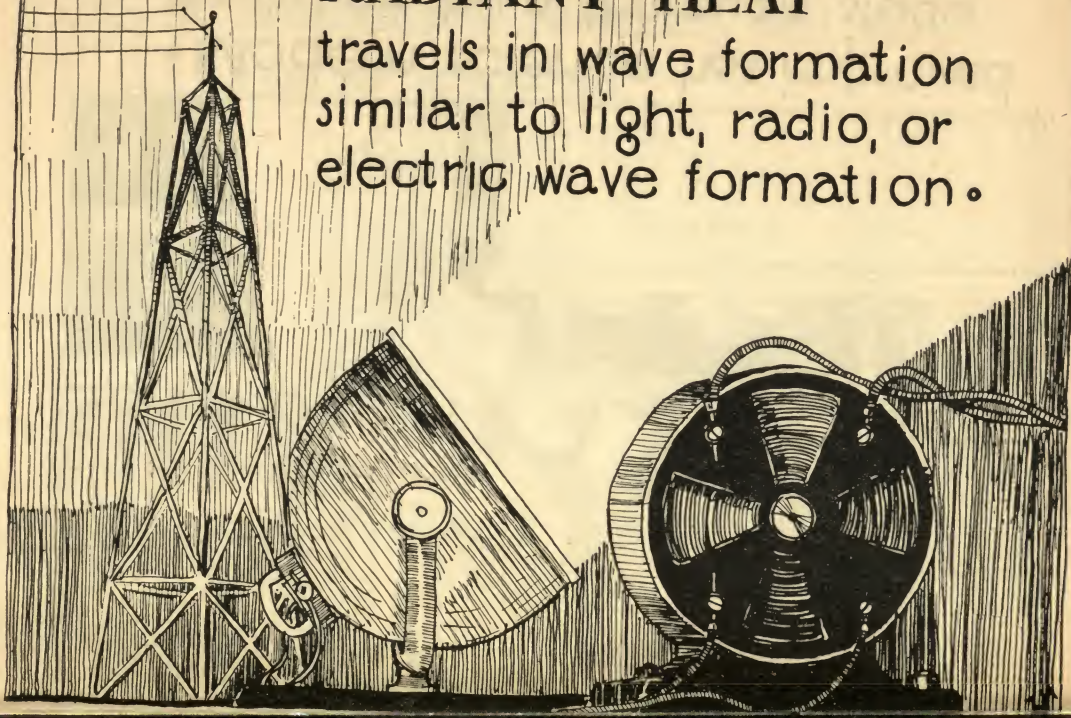
House No. 1 reflects back the radiant energy from the sun's rays. House No. 2 absorbs heat energy from the sun's rays, keeping the attic and bedrooms at an uncomfortable temperature even after midnight in hot weather.



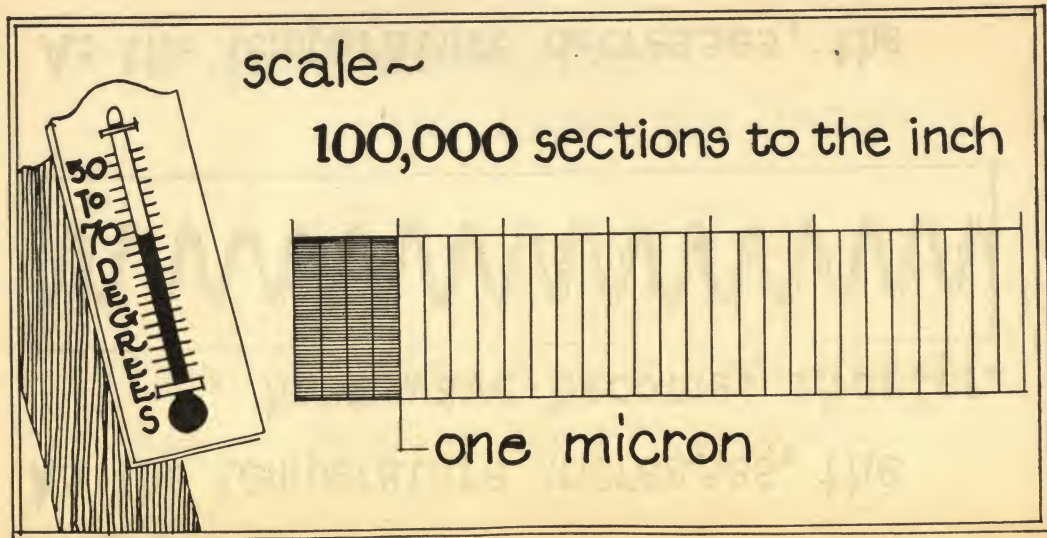
• Modern science has improved insulation by a thorough study of heat •

RADIANT HEAT

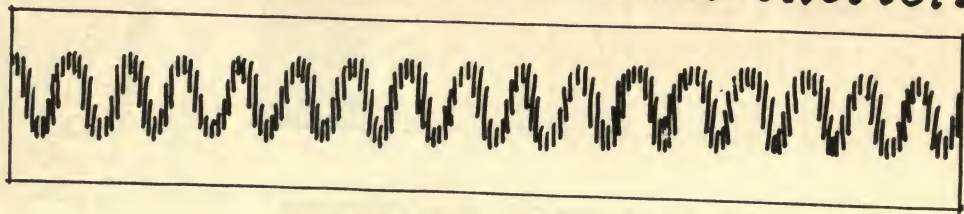
travels in wave formation
similar to light, radio, or
electric wave formation.



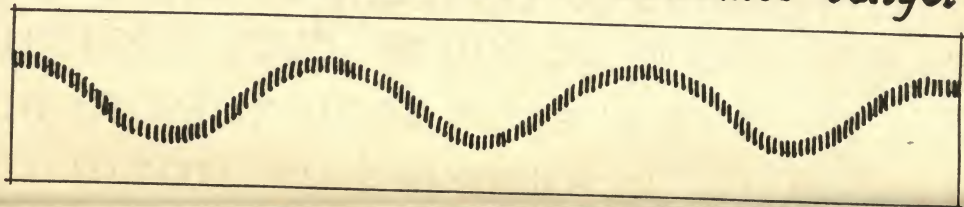
At a mean temperature of 50° to 70° F.
the radiant heat wave is 10 to 12
microns long (a micron is one millionth
of a meter or $\frac{4}{100,000}$ of an inch).



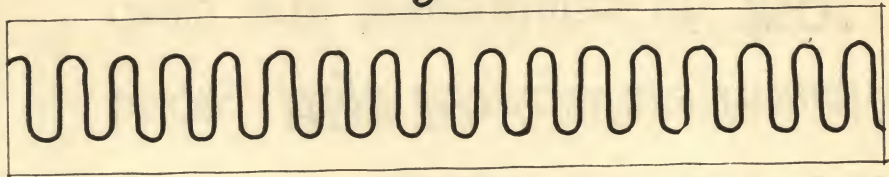
As the temperature increases, the
heat wave becomes *shorter*.



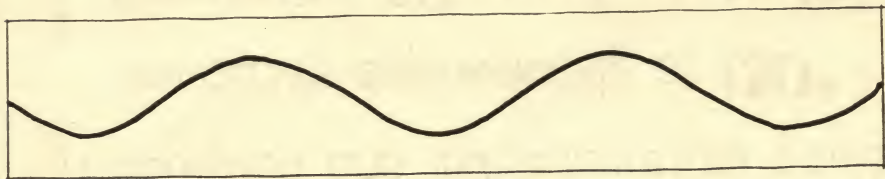
As the temperature decreases, the
heat wave becomes *longer*.



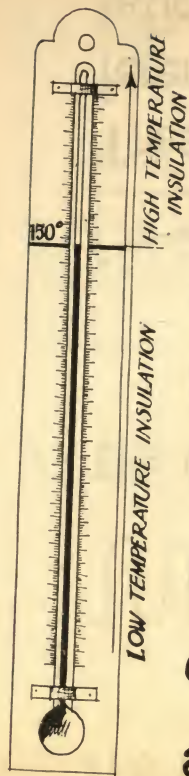
The higher the temperature
the *higher* the frequency



The lower the temperature
the *lower* the frequency



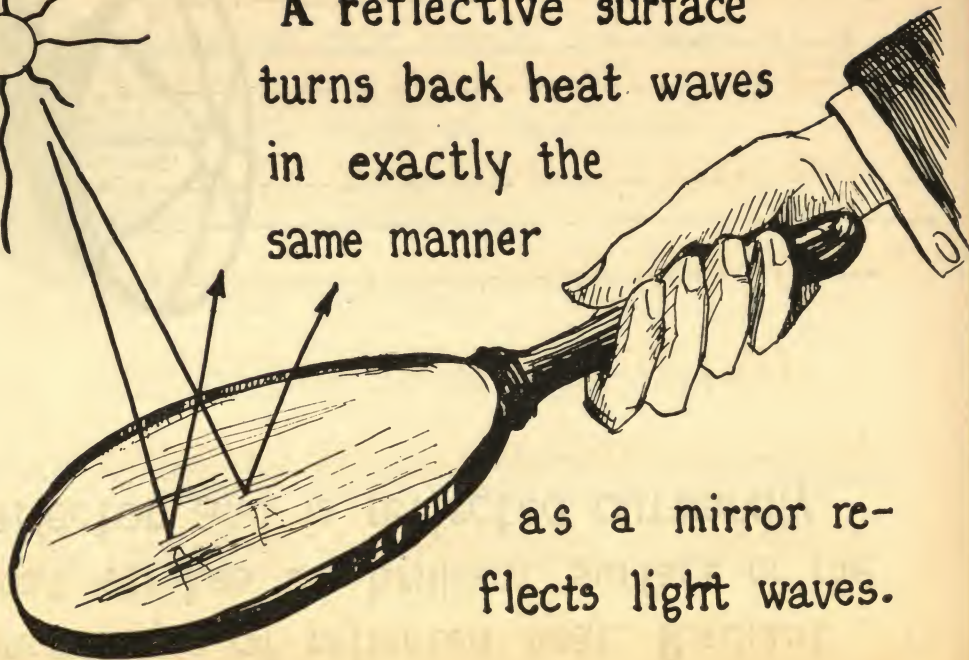
These changes serve to show the difference between high temperature insulation and low temperature insulation.



The break between high temperature insulation and low temperature insulation occurs approximately at **150° Fahrenheit**. *Silvercote* deals efficiently with all temperatures of **150°** and below. *High Temperature Insulation* deals with temperatures of **150°** and up.

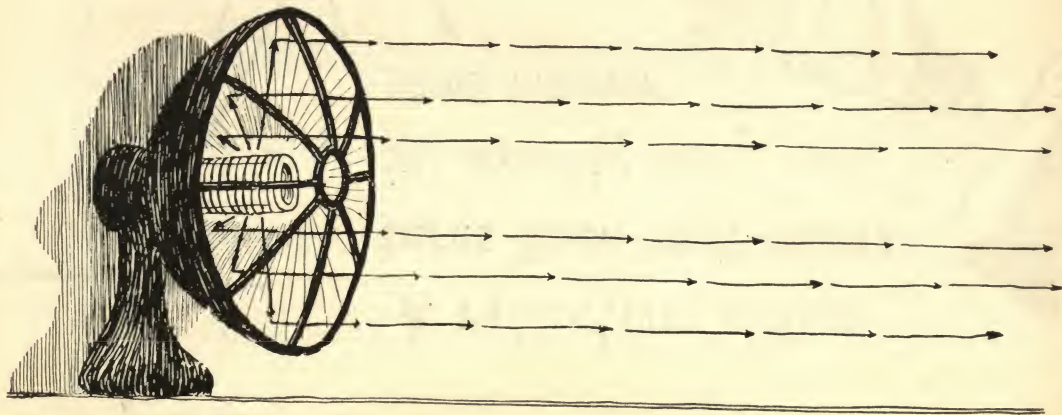


A reflective surface
turns back heat waves
in exactly the
same manner



as a mirror re-
flects light waves.

An example of reflected heat. **R**adiant heat strikes the brilliant surface of the reflector and is reflected outwardly.



Modern science and research sought for an insulating material that could be used as a reflecting element made of a mineral

that would not oxidize,

that would not corrode,

that was flexible in its application,

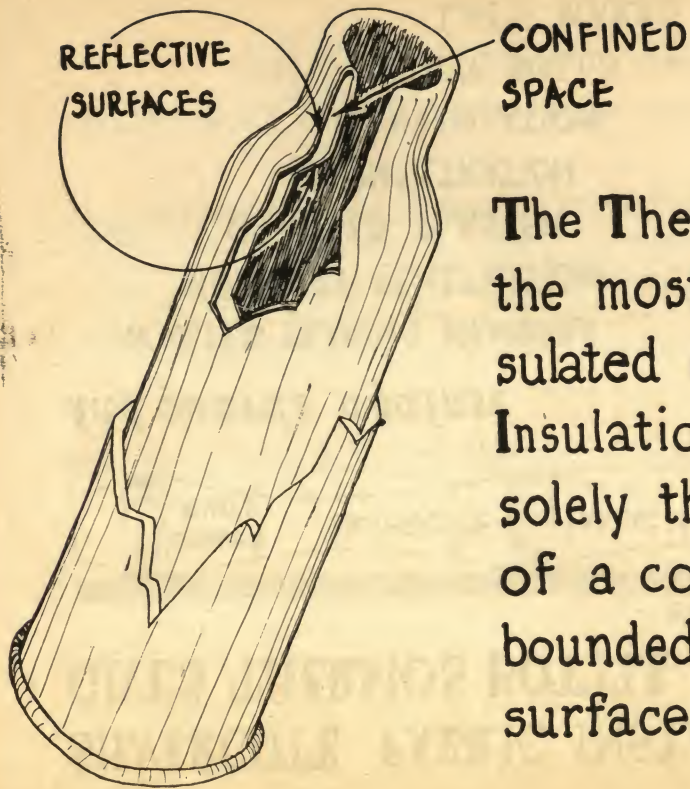
so that a tough, strong, highly homogeneous,
moisture repelling surface could be had at a reasonable price.

Silvercote Fabric,

Silvercote Coreboard,

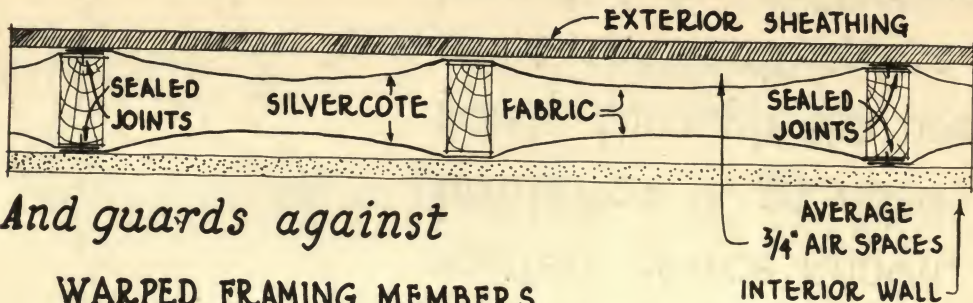
Silvercote Insulation Board

**effectively correct the moisture
problem and stop wind infiltra-
tion.**



The Thermos bottle is the most efficiently insulated device known. Insulation is provided solely through the use of a confined space bounded by reflective surfaces.

SILVERCOTE FABRIC INSTALLED IN WALLS GIVES THERMOS BOTTLE CONSTRUCTION



And guards against

WARPED FRAMING MEMBERS

MOISTURE PENETRATION

CRACKED PLASTER

AIR INFILTRATION

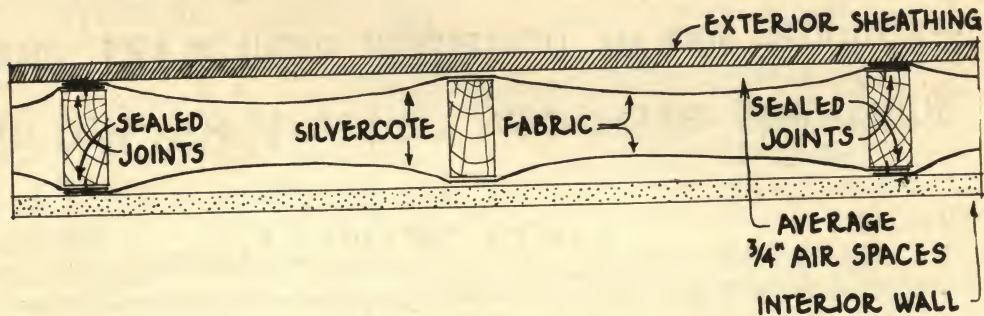
CONDENSATION

DIRTY WALLS

LATH MARKS

SILVERCOTE — FABRIC

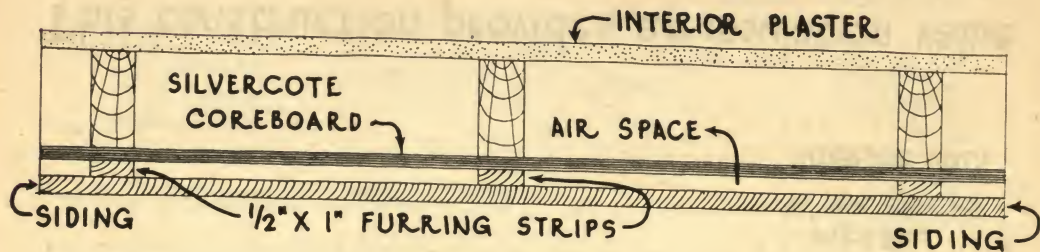
100% MORE INSULATION ————— $\frac{1}{2}$ THE COST



This construction provides an insulation value equal to **2"** of rigid board form (at bone dry and when not subject to wind infiltration) at a saving of approximately $\frac{2}{3}$ in cost.

SILVERCOTE COREBOARD

AS EXTERIOR SHEATHING



In this construction you have sheathing and **121%** more insulation in one application plus **9** times the tensile strength.

One layer of each Silvercote Product is equal in insulation value to the following charted thickness when used in walls to our specifications.

SILVERCOTE FABRIC

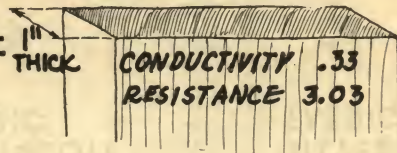
$\frac{1}{32}$ " THICK

CONDUCTANCE .33
RESISTANCE 3.03



= $\frac{1}{16}$ " THICK

**RIGID BOARD FORM
AT BONE DRY**

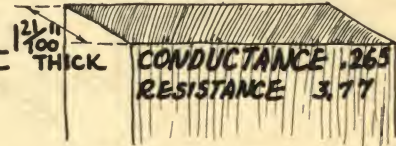


SILVERCOTE COREBOARD



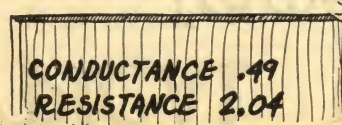
$\frac{3}{8}$ " THICK

=



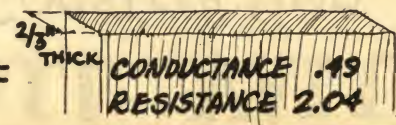
$\frac{2\frac{1}{2}}{100}$ " THICK

SILVERCOTE INSULATION BOARD



$\frac{3}{16}$ " THICK

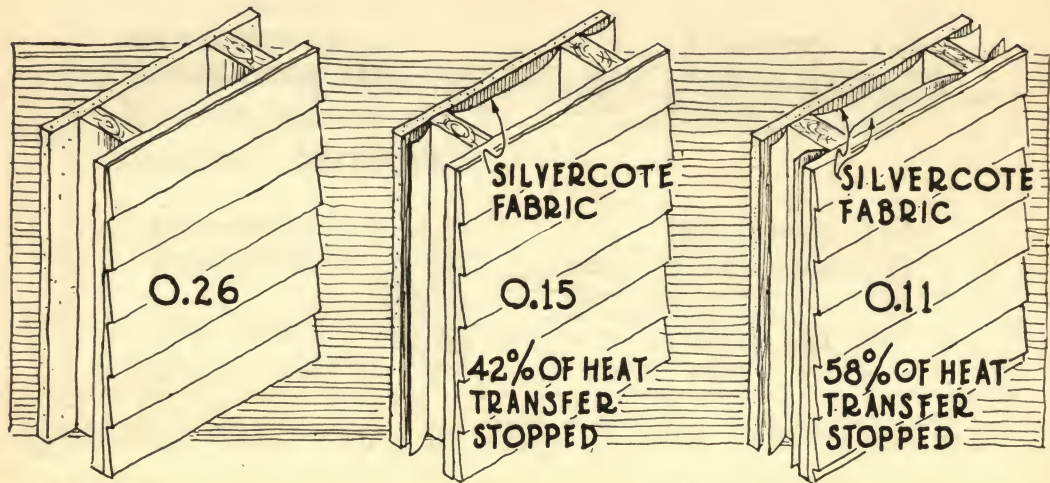
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$\frac{2\frac{1}{8}}{100}$ " THICK

TYPICAL WALL VALUES

Frame Construction



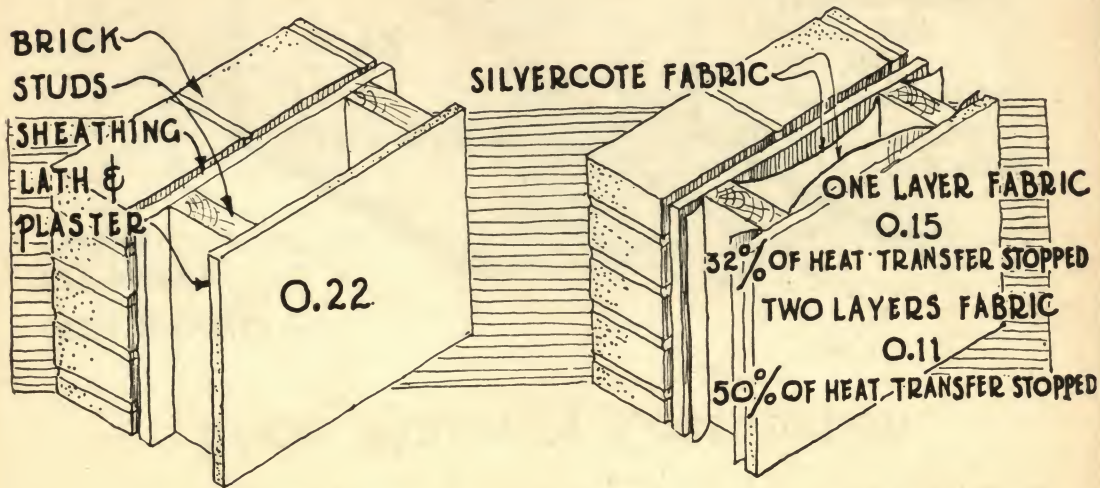
NO INSULATION
IN WALL

ONE LAYER OF
SILVERCOTE FABRIC

TWO LAYERS OF
SILVERCOTE FABRIC

TYPICAL WALL VALUES

Brick Veneer Construction

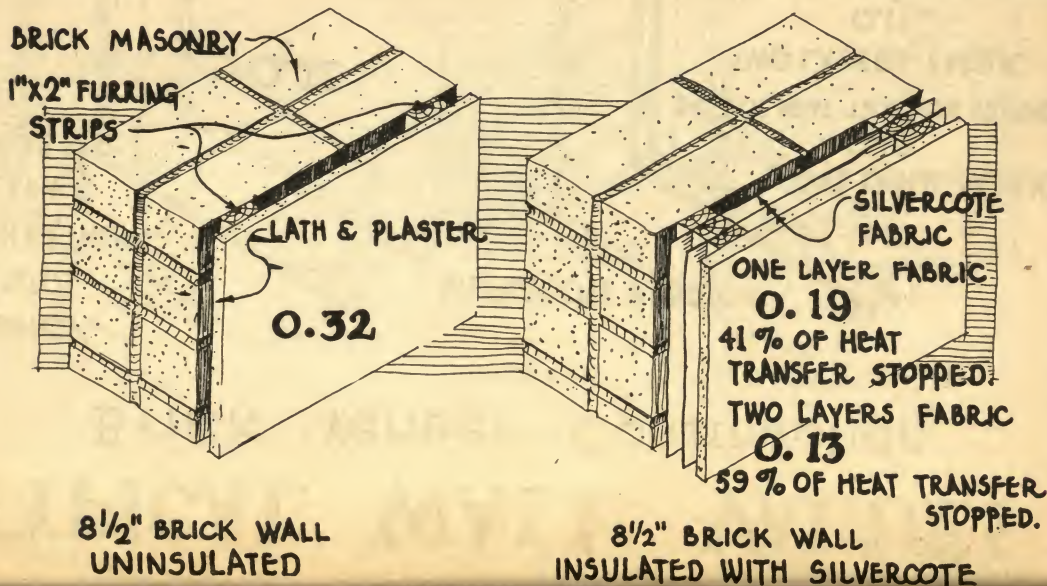


UNINSULATED WALL

INSULATED WITH SILVERCOTE

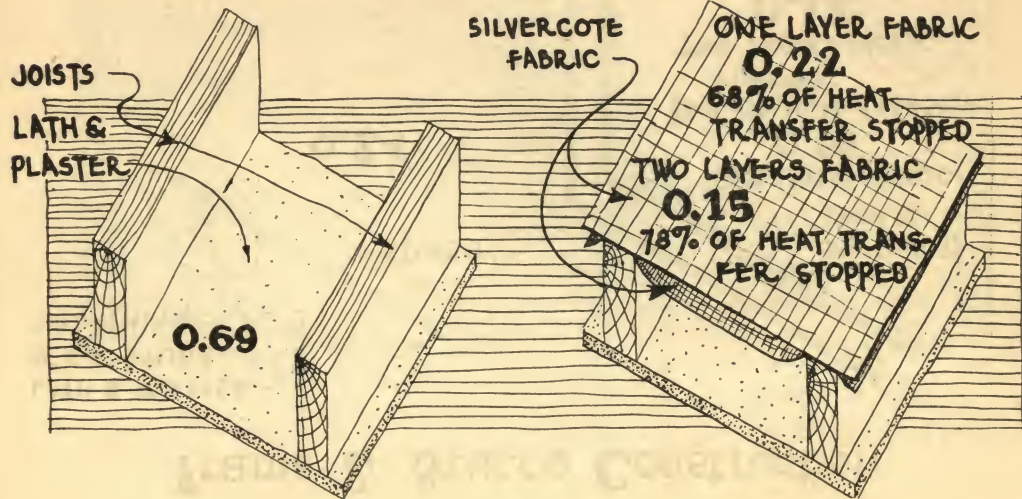
TYPICAL WALL VALUES

Brick Masonry Construction



TYPICAL WALL VALUES

Attic Insulation

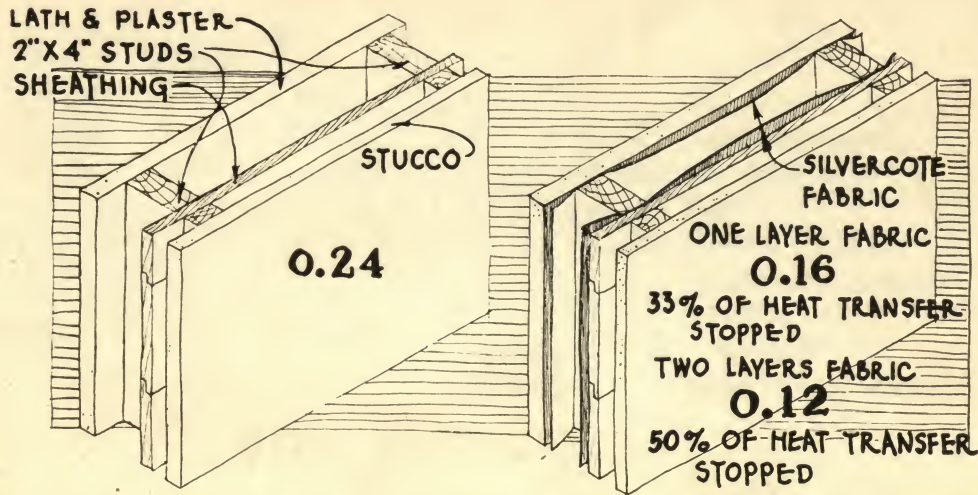


ATTIC FLOOR
UNINSULATED ::::

ATTIC FLOOR
INSULATED WITH SILVERCOTE

TYPICAL WALL VALUES

Frame & Stucco Construction

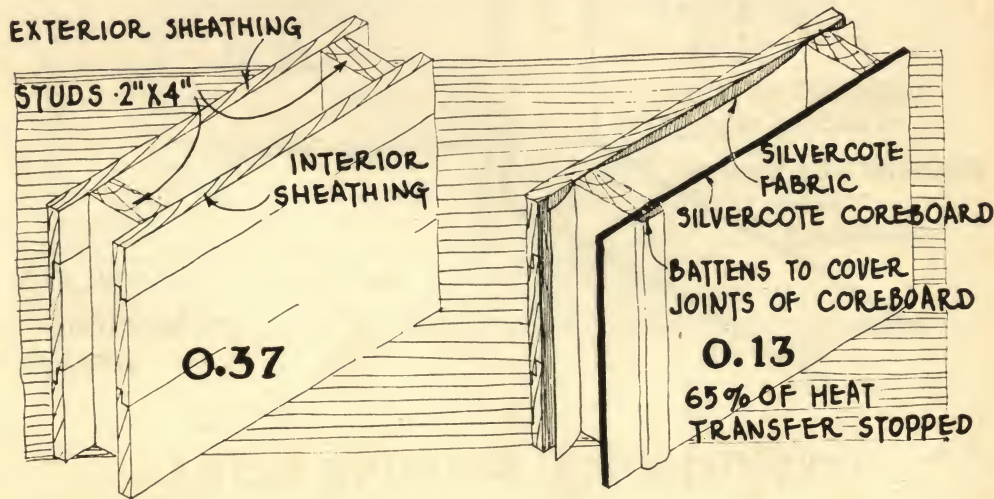


STUCCO WALL
NO INSULATION

STUCCO WALL- INSULATED
WITH SILVERCOTE

TYPICAL WALL VALUES

Farm Building Construction

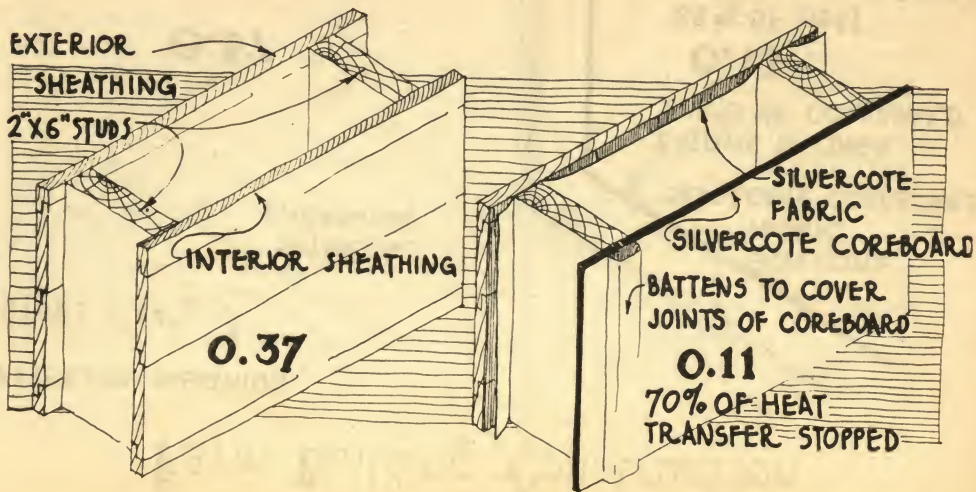


TYPICAL BROODER HOUSE
WALL - UNINSULATED

BROODER HOUSE WALL -
INSULATED WITH SILVERCOTE

TYPICAL WALL VALUES

Farm Building Construction

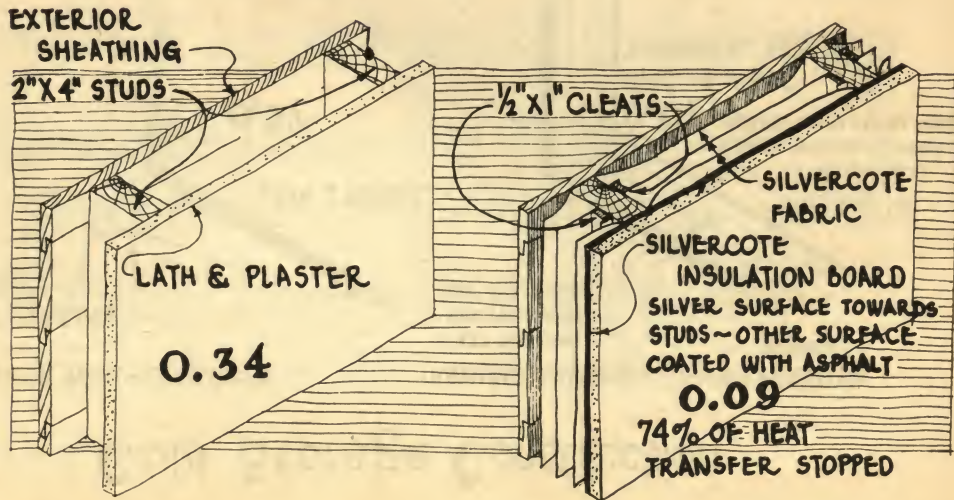


TYPICAL DAIRY BARN
WALL - UNINSULATED

DAIRY BARN WALL -
INSULATED WITH SILVERCOTE

TYPICAL WALL VALUES

Farm Building Construction

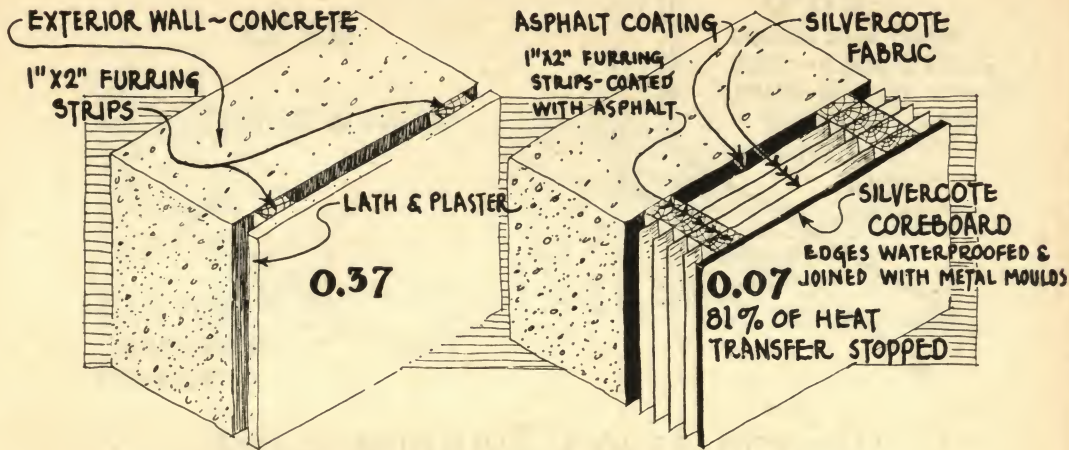


WALL FOR COLD ROOM FOR MILK,
FRUIT, PRODUCE, ETC. ~ UNINSULATED

COLD ROOM WALL ~
INSULATED WITH SILVERCOTE

TYPICAL WALL VALUES

Cold Storage Construction



COLD STORAGE WALL
NO INSULATION

COLD STORAGE WALL
SILVERCOTE INSULATION

All values claimed for Silvercote Insulation Products are confirmed by Professor J.C. Peebles of Armour Institute of Technology.

Silvercote Insulation Fabric~

Conductance **.33** ~ Resistance **3.03**

Silvercote Insulation Coreboard~

Conductance **.265** ~ Resistance **3.77**

Silvercote Insulation Board~

Conductance **.49** ~ Resistance **2.04**

**SILVERCOTE
FULFILLS
EVERY
INSULATION
REQUIREMENT**

such as:

Structural Building

Houses

Barns

Chicken Houses

Hog Houses

Railroads

Automobiles

Marine Boats



Decoration

Department Stores

Retail Stores

Theatres

Merchants

for

Interior Finish

Window Backgrounds

Signs & Placards

Displays

Cold Storage

Cold Storage Rooms

Breweries

Railway Refrigerated Cars

Tank Cars

Refrigerated Trucks

Meat Packers

Meat Markets

Bottling Companies

Bottling Company

Distributors

Candy Manufacturers

Candy Distributors

Ice Cream Manufacturers

Creameries

Dairy Farms

Fur Storage

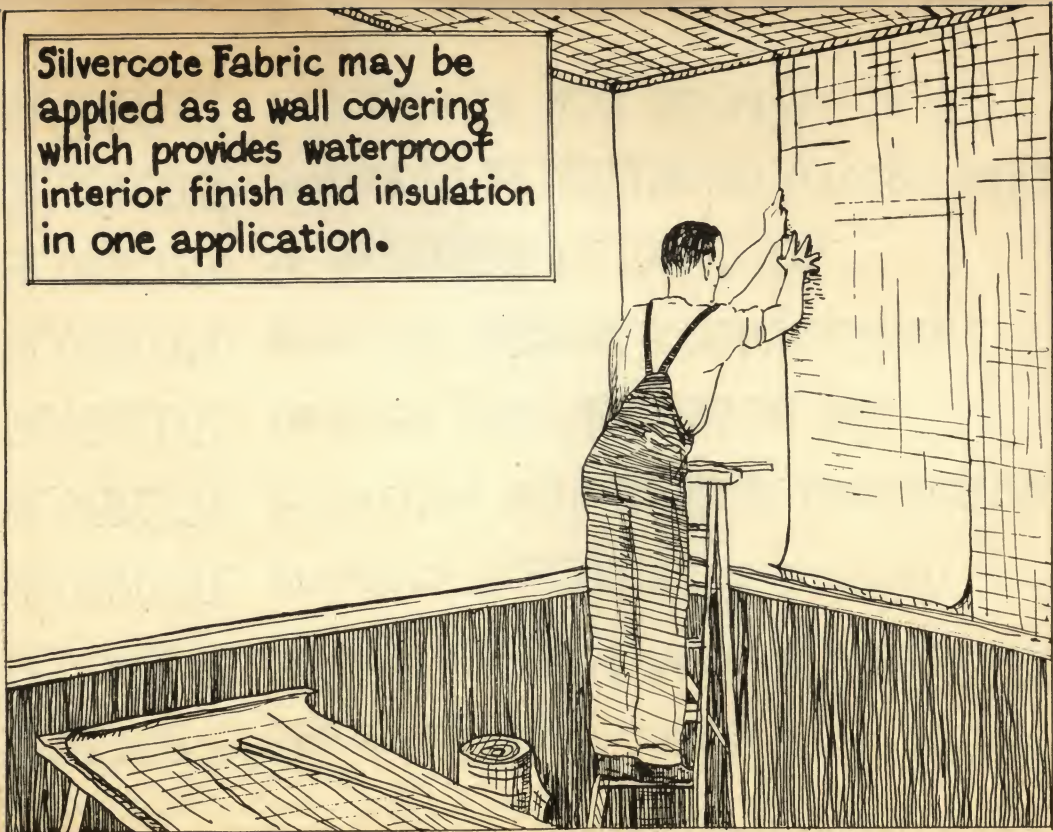
Potato & Vegetable

Warehouses

Refrigerators

Ice Boxes

Silvercote Fabric may be applied as a wall covering which provides waterproof interior finish and insulation in one application.



SILVERCOTE has a constant value.

SILVERCOTE prevents loss of heat in winter.

SILVERCOTE prevents discomfort in summer.

SILVERCOTE eliminates wall surface condensation.

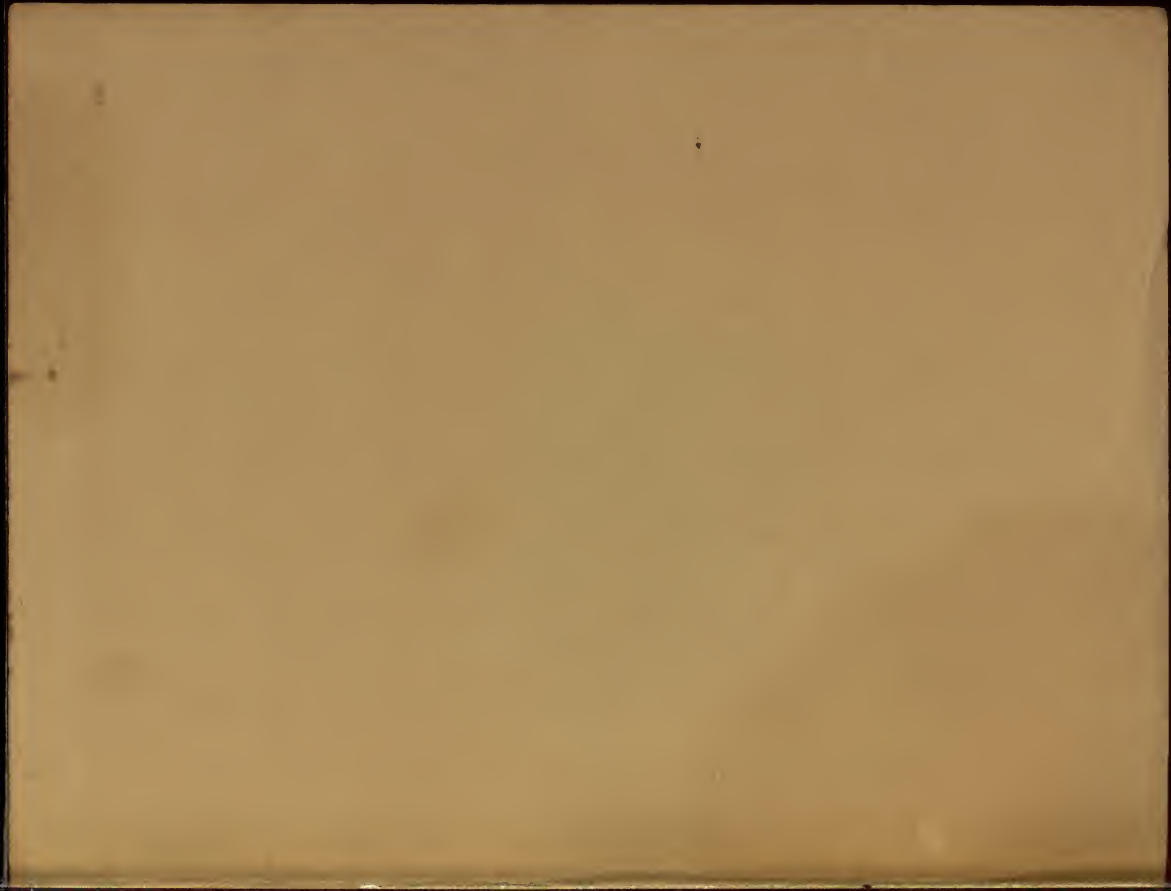
SILVERCOTE reduces your decorating bill.

SILVERCOTE prevents internal condensation.

SILVERCOTE is impervious to moisture.

SILVERCOTE eliminates air infiltration through walls.

SILVERCOTE is washable and durable.



SILVERCOTE in walls has 100% more
value at $\frac{1}{2}$ the price.

SILVERCOTE is the only permanent
moisture proof barrier against heat.

SILVERCOTE is manufactured under
U.S. PAT. NO. 2,001,912; May 21, 1935.

SILVERCOTE PRODUCTS, INC.